REDEEMER
UNIVERSITY COLLEGE

the Armitt
Collection

Charlotte Mason's House of Education,
Scale How, Ambleside, UK, 2009

The **Charlotte Mason Digital Collection** is a not-for-profit database created in 2009-2011 to assist scholars, researchers, educators and students to discover, use, and build upon the Charlotte Mason Collection of archives, journals and books housed in the Armitt Library & Museum (UK). To learn more about this database or to search the digital collection, go to The Charlotte Mason Digital Collection.

Your use of images from the **Charlotte Mason Digital Collection** is subject to a License. To publish images for commercial purposes, a license fee must be submitted and permission received prior to publication. To publish or present images for non-profit purposes, the owner, Redeemer University College, must be notified at cmdc@redeemer.ca and submission of a copy of the context in which it was used also must be submitted to the owner at cmdc@redeemer.ca. Credit lines, as specified in the License, must accompany both the commercial and non-profit use of each image.

Unless you have obtained prior permission, you may not download an entire issue of a journal nor may you make multiple copies of any of the digital images. Higher resolution images are available. [Low resolution (150 dpi), single copy printing is permitted: High resolution images for publication can be purchased. Please contact Redeemer University College in writing as specified in the License to request high resolution images.

While the document originals are housed in the Armitt Library & Museum, Redeemer University College owns the rights to the Digital Images (in jpg/pdf format) of the original archival documents and artifacts. The original Digital Images and database metadata are owned and maintained by Redeemer University College. Multiple images are bound together in PDF Packages. Click here to download the latest version of Adobe Reader for better viewing. In the PDF, click an image thumbnail to view it.

This project was made possible through collaboration among the Armitt Library & Museum (Ambleside, UK), Redeemer University College (Ancaster, Canada) and the University of Cumbria (UK) and with the financial assistance of the Social Sciences and Humanities Research Council of Canada.

Need help? If you do **not** see a side-bar with image thumbnails:
Some of the PDF packages are large and will take some time to download. A very large PDF package may open more successfully if you download it first to your desktop. (From inside the database record, right-click on the link to the PDF package and save the link to your desktop.) Once it's on your desktop, you can open it up with a recent version of Adobe Reader.

If you have a Macintosh with Safari, the default program to open PDFs is Preview, which does not open the PDF packets. Mac users need to download Adobe Reader. If this cover page appears without a list of PDF files (either at the side or bottom of the screen), look for a paper clip or a menu option to view attachments. If you click that, you should see a list of the pages in the PDF package.

Viewing files with Linux: This works with the default PDF viewer that comes pre-installed with Ubuntu. While viewing this cover page in the PDF viewer, click "View" on the top toolbar, and check the box that says "Side Panel". That will bring up the side panel. The side panel will show only this cover page. Click the 'arrow' at the top of the side panel, and it will give you the option to view "attachments." If you click that, you should see a list of PDF files, which are the pages in the PDF package.

Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

Thus then I take habits to be, not the exchangeable possession of the man, but to possess the man; not the mere clothes that he can doff and don at pleasure, but the core of self, the deep fountains of volition. They are the successive deep layers of that organized body, that cryptic secret, of which mind is the integument and outer aspect. And so is the old adage true, "The child is father of the man." The body is no less than a marvellous temple capable of sacred or quite infernal import; and the nervous system can become a Holy of Holies or sink of impiety, whence issue the fiats of High Heaven or of the Nether Hell The influences that play about adult life are storms that vex little or not at all the currents that move in the bosom of the deep. The conscious mind is chiefly the sport of the unconscious organization that is built up by years of habit; habit that has been formed as the valleys are formed by a subtle imperceptible and constant erosion. To parents and to educators the responsibility is great, greater than the heavy responsibilities of the surgeon or the judge. How desirable is it then that parents and teachers, who are usually sufficiently ready to yield a verbal assent to the Baconian proposition that "Custom is the chief magistrate of the human mind," should become aware of the fulness of the saying by knowing the scientific machinery by means of which the principle operates. Nor is it, to my mind, of vastly subordinate importance that they should at least learn to recognize that scientific explanation is, after all, merely our human means of prevision and pre-condition of wise action, but that it is not the ultimate fact, for there is no ultimate fact but that which is wholly and purely spirit.

SÉGUIN.

BY T. G. ROOPER, H.M.I.

HENRY TAYLOR says, "The world knows nothing of its greatest men." At any rate while the educational world is ringing with the praise of Pestalozzi and Froebel, I am not sure that it is aware that there is another name worthy to be associated with these two master minds, and form a triad uniting the intellectual forces of Switzerland and Germany with that of France.

The name which I would associate with the names of Pestalozzi and Froebel is that of Séguin; and it is of Séguin that I propose to give some account, commencing with a short biography, and afterwards describing his famous experiment in training what he calls an Idiot Hand and an Idiot Eye.

In 1880, there died in New York, Edward Séguin, at the age of sixty-nine, a man who on account of his life-long devotion to the science and art of restoring, or at least elevating in the scale of living beings, children wholly or partially imbecile and children of feeble intellect, well deserves to have his name recorded in the Liber Aureus reserved for the few men whose lives have been of great service to all the human race, without being the cause of the least harm to any part of it.

Séguin was born in Burgundy, in 1812, and came of a family of physicians of good standing and repute. He had a long line of ancestors who, for many generations, took a leading place as physicians in the Department of La Nièvre. After receiving a complete education (in this respect very unlike Froebel with his want of education) at the College of Auxerre, and then in the Lycée St. Louis at Paris, he studied medicine under a famous master of the subject, known as Itard, and also under Esquirol, the psychologist and "aliéniste" (Mad-doctor). Both Itard and Esquirol were profoundly interested in psychological studies, and Séguin had an opportunity of watching the apparently unsuccessful efforts of Itard to develop the mental powers of an idiot known as the Savage de L'Arveyron. At the early age of twenty-five his genius led him to the profound discovery which perhaps initiated the study of physiological education, and certainly advanced the art of training imbeciles in a most unexpected way, and what is more, the whole science and art of education. For of course other philanthropists had tried to teach idiots before Itard, and notably Vincent de Paul, but with what success is shown by the description of Idiocy in the Dictionary of Medicine published in 1837, where it is stated to be "the absence of mental faculties, or the almost complete nullity of the cerebral faculties," and further on, "it is in vain to combat idiocy; in order to restore the intellectual powers it would be necessary to remedy the conformation of cephalic organs which no means have been found hitherto of modifying at all." This was the traditional theory of idiocy, and until it was superseded, little progress could be made in assisting idiots. Séguin was led by his own researches to consider that idiocy was not so much due to the malformation of the brain as to its arrested development, which was the result of causes often pre-natal. He seems to have been the first to perceive that the nervous system was an organic whole, and that the brain was not the sole organ of intelligence, independent of the proper development of the peripheral nerves. He believed that the brain could not be properly said to act as a single organ, and that as in any organism the successful working of the whole depends upon the harmonious action, interaction, and reciprocal action of all the parts, so defective intellect might be due not to the absence of parts, but to the want of co-ordination of action among existing parts.

His idea of a remedy for this arrested development was training of a physiological kind. He contended that by a suitable physiological training of all the senses it would be possible to restore the idiot to a place in society, even if a humble one, and to make his spark of reason smoulder, even if it would never burst into a flame.

While Séguin was working at Bicêtre, he conducted experiments at his own expense, to meet which he earned money by writing for the press and by other literary labours. He wrote articles for one of the principal journals in Paris, of various kinds, including art, criticism, and certain others,

more filled with feeling and fire, on political and social subjects.

This brought him into connection with the most brilliant literary circle that has existed in Paris during this century. Among them were Ledru-Rollin, Louis Blanc, Michel Chevalier and Victor Hugo. All of these were disciples in the school of St. Simon, Père Eufantin and Olinde Rodrigue, and all alike believed in an approaching revolution when society would be reconstituted on the principle of the greatest happiness of the greatest number.

Among others, he came to know Louis Napoleon, while in his Republican days, but in 1850 he found it necessary, for political reasons, to exchange France for America somewhat hastily, leaving no address on his departure. He had, however, before quitting Paris, as the result of several years of study, written his epoch-making work on the moral training, the hygiene, and the education of idiots and defective children. This work, which was published in 1846, was crowned by the Academy and made the text-book on the subject in England and every civilized country. Meanwhile the working of Séguin's method had been demonstrated at the Paris Hospital for Incurables at Bicêtre, and had attracted much attention.

In America, partly by his writings, and partly by his influence, and partly by personal intervention, he founded, or caused the foundation of, various training places for idiots. Though well qualified in every way as a general practitioner and easily able to win a good practice and a lucrative one by the charm of his manner and his profound knowledge and skill, he was never able to tear himself from his special line of study, the proper treatment of idiots, to which he was ready to sacrifice everything; and, not unnaturally, his interest in the education of imbeciles extended itself to education in general. His book on "Idiocy and its treatment by the Physiological Method," is one which ought to be read by every serious student of educational literature. Séguin pursued his researches in various directions, and among other applications of his scientific method, he devoted much attention to the temperature of the blood, and it is to him we owe the use of the clinical thermometer, without some knowledge of which no intelligent mother would in these days undertake the hygienic supervision of her family, to say nothing of its use by medical men. Much again might be said of his views relating to gardens for children, but time allows it not. He died too soon to complete his work. Educationist, philosopher, philanthropist, man of science, he was perfect in all relations of life. Happy in his marriage, he left a son able to carry on the tradition of his family, and a group of friends in many countries on either side of the Atlantic inspired by his enthusiasm in the service of man. He was the honoured recipient of a letter from Leo IX. thanking him for his services in the cause of humanity. He was a lover of literature and fine art; he was devoted to plants, animals and children; he was a philanthropist in whose philanthropy there was nothing morose or spiteful, and all forms of social life, in what time he could spare for them, came to him as a welcome refreshment. Bold and independent in his views, he was kind and courteous to all and not least to his opponents, meeting attacks, however unworthy, with a Gallic shrug of the shoulders. Burning with indignation over social or political injustice, he never condescended to a disposition of intolerance, and not the least remarkable feature in his character was his sympathetic respect for religious creeds in which himself he had no share. He died without wealth, an exile from his country, leaving, however, a heritage far greater than millions of dollars, viz., institutions all over the world which strengthen humanity in its weakest part, and ideas and scientific methods which posterity will assimilate and carry out to greater perfection. His name lives not merely an honour to the land of his birth, the land of chivalry, but also to America, and indeed it merits the proudest addition—*humani generis decus*.

I have endeavoured to describe the man. I pass on to show the workman in his workshop. Before introducing you to the student in his own retreat, I will exhibit him as a critic of one of our English institutions. He was appointed to make a report for a special commission on the training of imbeciles in all parts of the world for the first exhibition of Vienna. He visits Earlswood among other places in 1867. "The English," he says, "have determined to have the greatest Asylum for Idiots in the world, and so far as money and goodwill could avail they have it. But Earlswood is under a Board of Governors and the physician is under their control. Hence they have a machine which is driven by men clothed in authority, instead of an organization resting on the tender sympathy and quick perception of a woman who is philosophically directed by some man familiar with the most recent anthropological discoveries.

"*Modus docendi*. Some sixty children formed a class which the teacher had divided into two parts. In front a few infants were being taught to read, while the rest sat behind with slates under orders to write a copy from a blackboard. A glance sufficed to make me put the following questions to myself: (1) Was it possible for the children to write this letter, (2) at such a distance from their teacher, (3) on a slate resting on their knees, (4) with a pencil that left but a slight mark on a surface polished by long use, (5) with a hand feeble, uncertain in movement, unprepared by preliminary exercises, guided by imperfect comprehension, the difficulty increased by the feeble powers of reasoning characteristic of such children who have lived long without instruction, and grown accustomed to act automatically? The slates gave me my answers. They were covered with vague, meaningless lines, often scarcely visible, which, signifying nothing to the writers, spoke volumes to me. There is another defect which is characteristic of great institutions where children are trained for public inspection. In each large class there were a certain number of those who may be termed false idiots, *i.e.*, children who are hardly normal, but suffer from the effects of epilepsy, chorea, and the like. These children are pushed forward at the expense of the genuine idiots. Of course they can answer all sorts of difficult questions, and their proficiency imposes on the public. Even this concession is not enough for the visitors. Idiots must be served in all sorts of sauce; there must be musicians, mathematicians, architects, and what not. Utilize time and money which ought to be shared by the whole in developing among a few children such special faculties as have survived the shipwreck of the rest, and you may astound fools and thus most effectively advertise your institution. Yet it is all useless. The musician, the architect or the mathematician, having but one faculty developed, remains none the less idiotic, and his possession will by no means give him a place in society. It is useless to develop one faculty at the expense of the rest;

if this is true of idiot asylums, it applies equally to ordinary schools and to the Universities. The English have yet to learn the principles of Physiological Instruction."

This visit took place in 1867, and five years later Séguin gave a far more satisfactory report.

I will now attempt to show Séguin at work on his own method, as explained to the world in a pamphlet on the "Idiot Hand and the Idiot Eye," or the training of an idiot child in New York. The following is the description of the Idiot Hand. The hand was small, the nails were dry and brittle; the fingers were short and badly finished; there seemed no power of resistance to pressure; there was no use in the hand whatever; in all respects its conformation exhibited characteristics which are the opposite of those which mark manual dexterity. Movement, however, there was, but it was automatic, having for its centre and lever the wrist. Vigorous as this automatic action could be, the child was quite unable to carry out the simplest direction which involved voluntary action. While, however, the hand was incapable of finer adjustments, the arm could be moved as a whole up or down, although with little precision in the movement, and at times even this action was beyond the child's power. The mistress commenced the process of educating this Idiot Hand by acting first on the shoulder, exercising in order first the muscles of the shoulder, then those of the fore arm, and then those of the wrist and hand itself. Thus voluntary movement was gradually extended downwards from the shoulder to the extremity of the fingers. The exercises were done at first through imitation of the teacher, but the child soon learnt to do them for himself as directed.

Thus the education commenced with purely physical exercises. The movements of the hand which ordinary children learn unconsciously and almost imperceptibly may be thus roughly classified, viz.: holding (both passively and intentionally), seizing, raising, lifting, dropping, throwing, snatching, squeezing, bending, breaking, beating, striking, modelling, combining, uniting, joining, dividing, parting, severing with knife or scissors or saw, according to the resistance offered by the material. The Idiot Hand was incapable of any of these movements. The first step in education was purely physical, consisting of a suitable series of exercises for the arm, hand

and fingers. The intellectual worth of these exercises depends upon the way they are ultimately done, their precision, their rapidity, their unity, their adjustment, their promptness and their subjection to control and will. The problem of getting the child to imitate his teacher's action in (say) raising his arm, is far from simple. He has to take notice of what his teacher is doing, to form a clear mental image of it, to transmit this image along with the intention to execute the actions which go to make it up to the limbs concerned. There is a triple series of acts, involving registration, volition and execution. The resistance which idiocy, active or passive, opposes to the teacher's efforts is for his or her skill and patience to overcome. The mistress reached the tips of the fingers of the Idiot Hand by commencing with the shoulder; and subsequently group after group of nerves and muscles previously given up to automatism was gradually won for voluntary action, and a set of apparatus that was merely brute was made subject to the sway of reason. The process of training was from great centres to smaller, and centrifugal. In time the delicate action of the peripheral nerves and muscles reacted on the central, and then improvement and training proceeded centripetally. As an example of the difference in the power to act according as the impulse is derived from regions nearer or further from the central axis, it was noticed that the child could drive a nail with a hammer before it could prick a hole on a given spot on a piece of paper. To use a hammer requires no movement below the wrist; it is a shoulder movement; on the contrary the use of the pin demands little action on the part of the great flexor and extensor muscles of the arm, but much complicated adjustment of the finer muscles of the fingers.

What was the result at the end of a year of this daily training of the sense of touch, this development of interaction or reciprocal action between the brain centres and the peripheral nerves? The child's hand had learnt to help itself, to occupy itself and to amuse itself, it ceased to be shoved into the child's mouth and bitten, or to strike the child's companions, although the automatic movements did not entirely cease. The touch was developed so far that the child would appreciate the ordinary differences of temperature in air, water and food, and would recognize and name blindfold by mere sense of touch some fifty objects.

The eye also being exercised in company with the hand, although strictly subsidiary in its use, learnt to distinguish typical forms, first the things themselves, next coloured pictures of them and then sketches or outlines, and by a simple transition the child was taught to cut out these things in paper. He also learnt to arrange objects of varying size according to their comparative dimensions.

As the child had shown a natural taste for flowers and especially sweetly scented flowers, he soon learnt in the garden the names of some thirty to say them correctly, and many more with less certainty. This love of flowers made him wish to plant and tend them; he also had a vase of flowers on his mantel-piece, and renewed the water daily with punctuality, and though busy with other occupations, he never forgot the right time to attend to this duty. Under these influences the sudden and violent emotions with which he had been afflicted before his training, the sudden flow of blood to the head, and senseless actions of passion and rage gave way to a calmer and sweeter disposition. These results showed themselves after a little more than a year in the following changes in his features. His mouth was no longer seen with hanging lower lip, his head was upright on the axis instead of lolling over to one side, and the curious semicircular depression of the forehead between the eyes had nearly vanished. The whole of this system of training is based upon the principle of physiological decentralisation. It would have been impossible as a system, although flashes of the principle have crossed the vision of educationists from the beginning, unless the idea of the sovereignty of the brain had not been profoundly modified by the appreciation of the immensely important part played in the intellectual development by the peripheral nerves.

The first year of training was devoted in the way described to the Idiot Hand, the second was spent in educating the Idiot Eye, and in an analogous manner.

The manual training of the first year had been concerned with the muscles of the arm and hand, the joints of these limbs and with the sense of touch. By the sense of touch the child learnt to comprehend many objects, and to express in words

the impressions which he derived from his sense of touch. He learnt to recognise many objects, to hold things, to put things down, to grasp, throw, etc., and acquired the command over his hand in many operations either immediately useful or indispensable for progress, such as washing and dressing, or holding a pencil or a knife. It took him a year before his hands, at first as flaccid as in death, could button a button or brush his coat. After this he would strengthen his hands by whittling a stick with a jack knife, and render his fingers more supple and pliant by tracing lines on a slate; he would also learn to throw or catch a ball, though awkwardly, and to manipulate clay so as to form a few models.

In commencing with the eye training, the doctors found the state of the eye as imperfect as that of the hand. Both eyes suffered from lateral nystagmus, that is, the eyeballs rolled from side to side with "a short uneasy motion," and the range of their movement was small. The pupils were of unequal size. He also suffered from hypermetropy. The optic nerves also were atrophied.

Nystagmus in idiots is of two kinds. It is either the rolling or oscillating movement above described, or else it is a tendency to fix the eyeball with a stare upwards and sideways towards one corner. During Séguin's treatment of this child it was ascertained by oculists that this movement of the eye was akin to the movements known as St. Vitus' dance or chorea, and this discovery led him to seek a remedy in physical training. The eye is educated through the hand. It was Séguin's object to bring the eyeball to repose, to direct it steadily upon an object, and by use of the hand in conjunction with the eye to give intelligence to the act of looking. It is well known of how much use the hand is in guiding the eye, especially in directing and fixing the attention. The hand of an adroit person has almost a language of its own. The Idiot Eye must first be trained through the Idiot Hand. The child must learn to use the index digit for pointing out objects. Special exercises are needed to develop this habit as thoroughly as possible. This exercise is by no means so easy as might appear. The child was taught by use of the index finger to seek and find, to look out for and to look at, to watch and to follow moving objects and objects at rest. A wide sweep of the hand would fix his eyes on an object, and small movements of the fingers would prevent his attention from wandering off it again. But sometimes his eyes would close when pointing rightly at an object, or else while his finger pointed at the object his eye wandered away from it, while he cried all the same, "Look, look." On such occasions Séguin never lost patience, nor did he resort to short and wicked words, much less blows. He wrote treatises instead on the obstinate fixing of the will, due, as he argued, to the inhibitory effect of the nerves upon the muscles when a sort of nerve storm is raging, an effect which he carefully distinguished from wilful opposition. The exercises which were necessary during the first year to overcome the flaccidity of the muscles of the hand were continued during the second year, and while at first the hand helped the eye, after a bit the eye, being improved, helped the hand, and the exercises having for their main object the improvement of either organ, the other being for the time subsidiary, at last met in a region where it is no longer possible to say which of the two is the principal one aimed at.

One of the ways of training the eye by the hand was to get the child to trace over a pattern supplied to him by the teacher on paper. At first sight this might seem training the hand by the eye, but it is not so. The hand has to follow a line marked out. To do this it calls upon the eye in a sort of reflex way to help it to follow the line correctly. Thus hand and eye are fixed on one point, and have to move together in one direction, but the hand sets the eye to work.

Eye exercises have been systematically devised for enabling the child to direct its gaze at will and with attention, upwards, downwards and sideways, and the occupations of tracing patterns, pricking them, and cutting them out with scissors, have all been found useful in reducing the disorders of the organs of vision, which have kept them cut off from communication with objects around them and caused the Idiot Eye.

Modelling has also been found useful. It was soon seen that a hand which had learnt to perform many of the useful services above described, such as dressing, etc., and also to use dumb bells and go through athletic exercises, was still much too nerveless to make an impression on soft clay. The first step in overcoming the difficulty was to get the child to squeeze an india-rubber ball and let it go again until the

rhythmical contraction and expansion of the ball communicated itself to the hand.

When the child was thus brought so far that he could act upon his material and impress upon it some shape, he was given some clay to work upon. As he could not use his fingers to much purpose owing to their weakness, he rolled the clay between his palms. A kindergarten teacher would expect this action to have shaped a ball. It did not. The resulting shape was a sort of cylinder, unequally conical at either end. The reason of this was the imperfection of the touch. To make a ball there must be muscular action combined with a sense of touch, which produce together the rotatory motion needed to make a spherical shape. If muscular activity is present alone, the clay becomes irregularly cylindrical. The child, however, as his sense of touch had gone through much preliminary training, soon proved equal to making a ball of clay. To form a cube or a pyramid in clay, besides action of muscle and touch, a third thing is required. The eye must be brought into play. And here at once a trap is set for the unwary teacher. It is hard to make a cube by use of hand and eye. The kindergarten teacher therefore shows her pupil how to flatten first one side of a piece of clay and then another on a slate or desk until six flat sides are produced. No doubt this is an excellent way to make a cube if it be your object to make a cube, but that is not the intention of the teacher of the idiot. He wants to enable the child to impress an idea of form on matter by an infinite variety of acts of pressure on the part of the nervous-muscular mass concentrated at the ends of the fingers. To instruct a child, whether normal or idiot, for show, let him use the table as a mould, and instead of his two eyes the legs of a pair of compasses to measure distance. But this is not education. It is to mistake means for ends and to make the hand and eye dependent upon mechanical aid just when by carefully graded exercises of increasing difficulty they are prepared to act independently of such crutches. The effect of it is to make the Idiot Hand and Eye return to the automatism from which you have been rescuing them so painfully.

It is not likely that the works of art in the way of drawing and modelling produced by such an artist as the child with hands and eyes as described would reach a high standard absolutely, so as to please others, but here are the results won for himself. He has learnt to express a mental image in clay, which, although imperfect, reveals to him the action of mind and will on matter; he has learnt to act at the instigation of another, to carry out his wish, and to form and carry out a wish of his own. His eye responds infinitely better than before to his hand in the way of directions, presentations, ideas and suggestions, and impulse; the oscillations of his eyeballs have decreased; the fixing of his eyeball at an angle is rarer and less persistent. The child's vision, the "idiot eye," is more under the control of his own will and that of those around him. The transition from things and acts to speech has been in this manner. His vocabulary is now reasonably correct; things and their names have been presented together, and in presenting objects care has been taken to name them along with their qualities, movements, characteristics; and, in addition to this, much attention has been paid to contrast, and along with a given quality, its opposite had been cited; similarly analogous ideas had been introduced where appropriate. Thus nothing had been spoken of without setting alongside of it some contrast or some analogous conception or object. Pictures, too, and portraits he loved to look at, having learnt to give value to every detail. In this way he knows by their face and actions a number of great men.[*]

"But," someone will say, "Seven or eight years old, and the child has not been learning to read or write. When will his education really begin?" "When," says Séguin, "his mind shall have been stored by the exercise of his senses with a number of correct impressions of objects. Let him remain in an 'analphabetic' condition until his preliminary stock of ideas gives him some chance of being able to follow what he reads, and then he will not be exposed to the absurdity of being set to read by some teacher, really more imbecile than himself, what he does not understand a word of. Let him for some time at any rate be set to read what he has himself helped his teacher to compose and what he has himself written."

---

[*] See *Archives of Medicine*, October, 1879.

ELEMENTARY SCIENCE-TEACHING.

BY MARY EVEREST BOOLE.

(*Continued from page* 604.)

WE must now go a little further into the questions:—What is that essence of scientific method on which its essential scientific quality depends? What are the conditions for securing it? How has it been introduced into science colleges? How might it be introduced into elementary teaching? Are there any special difficulties in so introducing it; and if so, how can they best be overcome?

An individual gets his information about any given class of facts from a variety of sources: his own observations on facts; what he learns on more or less reliable testimony as to what others have observed; theories—some true, some false, which have been held by human beings to account for the facts; and his own thinking about the facts. The essence of scientific method, so far as I at all understand the great men who have formulated it, consists in keeping the produce of the three external sources of information *apart in the mind* till the lid is shut down, so to speak, on the outer world, and the process of thinking has begun.

In learning dead languages there is little scope for the process which in science we call thinking: the pupil has not got to wrestle with Nature and wring from her any secret about why things are so, but to know how words were used by certain ancient authors. Philologists indeed do think about how such and such use of words grew up; but that is precisely because they are not mere classical scholars, but are students of linguistic science. And as to the other processes by which we gain knowledge, there is no need for the classical student to keep them severely separate. There is no need for him to be able to say exactly how he came by his knowledge of the quantity of a Latin syllable. Whether he first noticed how Virgil uses it, or learned a grammar rule